



INSECTS INJURIOUS TO THE APPLE-TREE:

WITH

SUGGESTIONS AS TO THEIR CONTROL OR
EXTERMINATION.

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PREFATORY NOTE.

There is no fruit cultivated in Rhode Island so generally useful and satisfactory as the apple. Yet from lack of knowledge, or by neglect, a large percentage of each crop is wasted, and at least one-third of the fruit offered for sale is wormy, and its money value seriously reduced.

The first general principle for improvement of these conditions is clean cultivation, embracing careful pruning and covering the scars with suitable paint to prevent the entrance of insects and water. The cutting down of trees badly infested with vermin, and past usefulness, and prompt burning; keeping the ground clean; turning up the soil around the trees to bring hidden insect forms to the surface, where they are exposed to birds and extremes of heat and cold, are necessary to profitable cultivation.

Good fertilization will also give to the trees strength to resist the attacks of parasites. The accompanying suggestions describe briefly certain species of insects that a Rhode Island farmer may discover working in and about his trees, followed by a list of insecticides for beneficial application, and a mention of birds, toads, and insects that should be protected and encouraged to resort to the orchard.

It has been demonstrated by the examination of their stomachs that 6 per cent. of the total food of Massachusetts toads is rose beetles, 5 per cent. wire worms, 16 per cent. cut worms, 9 per cent. tent caterpillars, and 5 per cent. curculios, with an aggregate of 80 per cent. of noxious insects in general.

In the following list the words larva (singular) and larvæ (plural) apply to the forms commonly called caterpillars, grubs, and worms.

For complete and accurate descriptions, read "Insects Injurious to Fruits," by William Saunders, F. R. S. C.; "Half Hours with Insects," Dr. A. S. Packard, Jr.; "Injurious Insects of the Farm and Garden," Mary Treat; Bulletin 46, Hatch Experiment Station, Amherst, Mass.; to which publications the writer has frequently referred in preparing this paper.

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INSECTS INJURIOUS TO THE APPLE-TREE.

HARMFUL BEETLES.

TWO-STRIPED APPLE-TREE BORER (*saperda candida*). The larva is three-quarters inch long, white, with brown head. Girdles under the bark in the lower trunk, and even under ground. Adult, three-fourths inch long, creamy-striped, and with long horns.

Beneficial factors.—Woodpeckers. Wash the trunk with a paint made of soft-soap, thinned with a strong solution of washing-soda in water, during June and July, or wrap the trunk loosely with wire gauze or mosquito-netting from late April to September. Extract the larva with knife or wire.

SPOTTED BORER (*saperda cretata*). Habits and appearance much like two-striped apple-tree borer. Rare in Rhode Island.

Beneficial factors.—Treatment like two-striped apple-tree borer. Applied higher up onto the lower branches.

FLAT-HEADED BORER (*crysobothris femorata*). Larva, anterior end very large, straw-colored, and footless; in the trunk and low branches. Adult, half an inch, dark green bronze.

Beneficial factors.—Woodpeckers, ants, ichneumon flies, and the soft-soap paint. Clean cultivation.

HARRIS' BORER (*crysobothris harrisii*). A beetle similar to the flat-headed borer, migrating from the maple to the apple-tree.

Beneficial factors.—Birds. Treatment as for two-striped apple-tree borer.

PRICKLY, LONG-HORNED BORER (*Leptostylus aculifer*). Larva, straw-colored body and dark head. Winding channels under the bark. Adult, one-third inch, brown-gray, and prickly.

Beneficial factors.—Various birds, toads. Apply soap wash in early August.

CYLINDRICAL BARK-BORER (*Tomicus mali*). Not common. Larva, small, soft, and white. Adult, one-tenth inch, chestnut brown with yellow legs.

Beneficial factors.—Birds, toads.

APPLE-TWIG BORER (*Amphicerus bicaudatus*). A small, dark brown beetle, damaging nursery trees chiefly.

Beneficial factors.—Birds. Pruning and burning all bored twigs and their contents.

APPLE LIOPUS (*liopus facetus*). Branch and bark borer. Adult beetle, one-quarter inch, ash gray. Rather rare.

Beneficial factors.—Birds, and treatment as for apple-twig borer.

STAG BEETLE (*Lucanus dama*). Large, whitish larva, with red brown head. In the roots and trunk. Does little harm.

Beneficial factors.—Birds, toads, soap washes.

EYED ELATER (*Alaus oculatus*). Larva in decayed wood. Over two inches long. Beetle one and one-half inch, black-streaked and powdered with white. Has two large, velvety eye spots. Does little damage.

Beneficial factors.—Toads.

ROUGH OSMODERMA (*Osmoderma scabra*). White, fleshy larva, with reddish head. Adult beetle, one inch, flat and square purple black body. Inhabiting decayed wood. Does little damage.

Beneficial factors.—Toads.

WHITE-LINED PSENO CERUS (*Psenocerus supernotatus*). Larva, small, white, and footless, with yellow head. Boring in stems, usually, of currant and grape. Beetle, cylindrical, with long horns, reddish brown. Flying in May.

Beneficial factors.—Birds. Pruning.

BROAD-NECKED PRIONUS (*Prionus laticollis*). Larva, a large, fleshy grub, at the roots. Adult, one to two inches, black, with long, jointed horns.

Beneficial factors.—Birds, toads.

BUMBLE FLOWER-BEETLE (*Euphoria inda*). A woolly, yellow brown, black-spotted beetle, three-quarters inch. Eating some fruit in September. Does little harm.

Beneficial factors.—Birds.

OAK-PRUNER (*Elaphidion villosum*). Larva, three-quarters inch, yellowish white, black and brown head, boring small branches, causing them to fall. Adult beetle, dull gray, small, with long horns.

Beneficial factors.—Birds. Gather the fallen branches and burn them.

SNOUT BEETLES, WEEVILS, CURCULIOS. Larvæ, small, soft, and white, with no feet. Feeding in fruit, and changing under ground. Beetles, small, dull grays and browns, with long snout to push their eggs into the fruit.

Beneficial factors.—Birds, toads. Paris green sprays on the early foliage, jarring the beetles onto a sheet, all the more useful if wet with kerosene. Destroy promptly all fallen fruit.

LEAF BEETLE (*Odontata rubra*). Larva bores in the leaf, forming blotches. Adult, reddish, one-fifth inch. Does little damage.

Beneficial factors.—Birds, toads.

ROSE BEETLE (*Macrodactylus subspinosus*). This yellowish drab beetle is well known, attacking the rose and grape. Eggs and larvæ all under ground.

Beneficial factors.—Birds, toads, jarring the trees, spading up, and hot water on the ground.

CLOAKED CHRYSOMELA (*Glyptocelis crypticus*). A stout, cylindrical, ash gray beetle, one-third inch long, eating leaves in May and June.

Beneficial factors.—Birds, toads, Paris green sprays.

LICE.

WOOLLY LOUSE (*Schizoneura lanigera*). Sucking juice from the bark and roots.

Beneficial factors.—Birds, spiders, several flies, the lady-bird beetles, and their larvæ. Hot soap-suds or hot water poured on the roots. Carbon disulphide at the roots. Kerosene emulsion sprays on the branches.

OYSTER-SHELL BARK LOUSE (*Mytilaspis pomorum*) and

SCURFY BARK LOUSE (*Chionaspis furfurus*).

Beneficial factors.—Birds, a species of mite, lady-bird beetles, and their larvæ. Spray with kerosene emulsions. Scrape off and burn dead bark. Whitewashing.

APPLE-TREE APHIS (*aphis malifolia*). White or yellow green louse, sucking the juice of the leaves.

Beneficial factors.—All small birds, lady-bird beetles, and their larvæ, lace-winged, golden-eyed flies. Scrape off and burn dead bark. Spray with kerosene emulsions.

TREE HOPPERS. Do very little damage.

MOTHS AND BUTTERFLIES.

TENT CATERPILLAR (*Clisiocampa americana*).

Beneficial factors.—Orioles, cuckoos, ichneumon flies, and a mite. The copper spot beetle, or fiery searcher (*Calosoma calidum*), and the bronze and green searcher (*Calosoma scrutator*). They both eat all sorts of larvæ. Wipe down the nests or burn them out early in the morning or just before dusk. Destroy in June and early July, the silky, yellowish, oval cocoons, spun in out-houses, under fence-rails and clapboards.

FOREST TENT CATERPILLAR (*Clisiocampa sylvatica*). Eating the leaves in May and June.

Beneficial factors.—The natural enemies are about the same as those of the tent caterpillar. As additional remedy, tie burlap or cloth a foot wide around the trees, bend it over at the top, and keep the underside sticky with tar or printing ink.

TUSOCK MOTH (*Notholophus leucostigma*). Larva very hairy, black, yellow, and white, with red head. Adult male an ashy gray moth; the female a whitish, hairy, wingless, grub-like creature.

Beneficial factors.—Various flies, toads. Scrape out all the white silk and hairy cocoons from under fence-rails, clapboards, and the crevices in the bark of the trunk and lower limbs, and burn them. Spray Paris green, and wrap the unattacked trees to prevent the ascent of caterpillars.

CANKER-WORM MOTHS. Spring brood, and fall brood. The larvæ change under ground, and issue from October to December, and from March until May.

Beneficial factors.—Birds, particularly the cedar waxwing, flies, wasps, a mite, and the assassin bugs. Bind the trees with burlap, as for the forest tent caterpillar, from October until June. Scrape off all loose bark and burn it, then whitewash the trunk, adding a teaspoonful of Paris green to a pail of wash.

YELLOW-NECKED CATERPILLAR (*Datana ministra*). They swarm together and eat the leaves, and change under ground.

Beneficial factors.—Toads and ichneumon flies. Crush them as they hang, or cut off the branches full of larvæ and burn them.

RED-HUMPED CATERPILLAR (*Oedemasia concinna*). Eating the leaves, and changing on and under ground.

Beneficial factors.—Jar them down onto a sheet, and treat also as the yellow-necked caterpillar.

FALL WEB WORM (*Hyphantria canea*). The moth is milk white. Spreads one inch. Hairy caterpillars, eat during June, July, and August.

Beneficial factors.—Cuckoos, probably, and the spined soldier bug. Cut off and burn the branches and webs.

GIANT SILK-WORM (*Samia cecropia*). The large larva is green, with blue and red tubercles. Adult moth brown and red, spreading five to seven inches.

Beneficial factors.—Birds, ichneumon flies. Crush them by hand. Gather from small branches and bushes the large brown cocoons, and burn them.

AMERICAN SILK-WORM (*Teia polyphemus*). Larva green, with gold side-bars. Adult spreads five inches, yellow brown, a transparent spot in each wing, a broad, black border around those in the hind wings.

Beneficial factors.—Birds, ichneumon flies, small rodents. Collect and burn the large cocoons that fall to the ground rolled up in a leaf.

EYED SPHINX (*Smerinthus esacatus*). Larvæ eat leaves at night. Larva, green, two and one-half inches, changes under ground. Narrow-winged moth, three inch spread, upper wings fawn, hind wings rose color, with black spot and blue center. Does little harm.

Beneficial factors.—Birds, ichneumon flies, fall digging to expose the under ground form.

APPLE SPHINX (*Sphinx gordinus*). Larva, apple green, with violet side-bars, two and one-half inches, changes under ground. Adult, gray, black, and brown, expands three inches. Does little harm.

Beneficial factors.—Enemies and treatment the same as eyed sphinx.

LAPPET MOTH (*Tolype velleda*). Larva in June and July, two inches,

blue gray, warty, and hairy; cocoon on the branches, of brown silk and hairs. Adult, two inches, blue gray and woolly. Does little harm.

Beneficial factors.—Birds, toads.

LEAF ROLLERS. Two or three species of small caterpillars, developing into small moths. They silk the leaves together, eating them, as well as young fruit, during June, July, and August. They change within the folded leaves.

Beneficial factors.—Birds, ichneumon flies, Paris green sprays, and crushing the folded leaves.

LEAF CRUMPLER (*Phycis indigenella*). The larva in late summer; one-half inch; head, red brown; body, green brown. Silks the leaves onto the branches, and changes inside.

Beneficial factors.—Ichneumon and tachina flies. Burn the leaves off in the winter, or pick them by hand and burn them.

SPOTTED BUD MOTH (*Tmetocera ocellana*). Larva, a naked brown caterpillar, three-quarters inch, eating buds and young fruit; lives in silk-lined clusters of blackened leaves. Moth in July, half inch spread, ash gray and dusky brown.

Beneficial factors.—Birds. Take off, and crush or burn the leaf clusters and damaged fruit.

APPLE-BUD WORM (*Eccopsis malana*). Larva, pale, pale green, with yellow head, black dotted; eats and changes on the leaves and tips of branches in June, August, and September. Adult moth, small, mottled green brown, with dusky hind wings.

Beneficial factors.—Birds, Paris green sprays, and hand cleaning.

MANY-DOTTED APPLE WORM (*Nolophana malana*). Larva, light green, white lined, and spotted; eat from the under side of the leaves, changing inside the leaf. Moth, ash gray, spreads one inch, moderate damage.

Beneficial factors.—Birds, Paris green sprays, and jarring onto a sheet wet with kerosene.

APPLE-LEAF SEWER (*Phoropteris hammondi*). Larva, yellow green, yellow head; feeds inside a leaf sewed together. Moth, white and brown.

Beneficial factors.—Birds. Gather and burn leaves in the autumn.

LEAF SKELETONIZER (*Pempelia hammondi*). Larva, pale brown, draws leaves together and changes within. Moths fly in May and June; purplish gray, with silver bands, one-half inch.

Beneficial factors.—Ichneumon flies, Paris green sprays, and hand picking.

PALMER WORM (*Ypsolophus pometellus*). Larva, yellow green, striped body, with black dots, yellow head, and one-half inch long, eating in colonies, changes among the leaves, on bark, or on the ground. Adult moth is ash gray, sprinkled with black.

Beneficial factors.—Toads, Paris green sprays, jarring onto a sheet, and burning of all rubbish under the trees.

CLIMBING CUT-WORMS. Several species. Larva, naked, one inch to two inches long, changes under ground. Adult moths, one and one-half to two inches, gray and brown.

Beneficial factors.—Birds, toads, Paris green sprays, jarring on a sheet, burlap bands around the trees, hot water on the ground, and spading.

LIME-TREE WINTER-MOTHS (*Hyibernia tilharia*). Larva, a span worm; head, red, with a V mark; body, yellow, with black lines; feeding in May and June; changes under ground. Male moth, rusty buff and spotted, hind wings paler, emerges in October and November. Female, wingless.

Beneficial factors.—Birds, Paris green sprays, jarring the tree and general treatment as for canker-worms.

WHITE EUGONIA (*Eugonia subsignaria*). Larva, dark brown, with red head and tip, eating in May. Moth, white, one and one-half inch.

Beneficial factors.—Birds, spraying with Paris green.

APPLE-LEAF MINER (*Tischeria malifoliella*). Larva, small, pale green, with brown head. Moth, brown, spreads a quarter-inch; does little damage.

Beneficial factors.—Burn all dead leaves.

APPLE-TREE CASE-BEARER (*Coleophora malivorella*). Larva, yellow, with black head, feeding on the under side and skeletonizing leaves, and into the buds; changes on the tree. Moth, half an inch, white and brown, flying at night.

Beneficial factors.—Birds, and Paris green sprays.

RESPLENDENT SHIELD-BEARER (*Asphidisca splendoriferella*). Larva, yellow brown, with dark head, one-eighth inch, June to September. Tiny moth, gold and silvery.

Beneficial factors.—Birds, parasitic flies, and Paris green,

APPLE-LEAF BUCCULATRIX (*Bucculatrix pomifoliella*). Larva, yellow green body, few hairs, brown head, one-half inch. Tiny moth, narrow wings, pale yellow and brown.

Beneficial factors.—Birds, parasitic flies, oily emulsions sprayed or brushed on the twigs during winter.

CODLING MOTH (*Carpocapsa pomonella*). Larva, head, brown; body, flesh color; bores up the core and out at one side of the apple. Moth, pale gray, with gold bands and brown spots, five-eighth of an inch. Eggs are laid on or near the fruit buds.

Beneficial factors.—Ichneumon flies. Spray with Paris green after the blossoms fall and while the stem stands upright. Feed to pigs, or completely destroy all fallen apples. Keep loose bark scraped off and burned. Wind old cloth, six inches wide, loosely around the trunk from June 1st to September 1st. Tie or tack it, and remove every ten days, killing all vermin hidden in or under it.

ASH-GRAY PINION (*Lithophane antennata*). Larva, pale green, with cream spots and bands; bores in young apples in June, and changes under ground. Moth, ash gray, one and one-quarter inches.

Beneficial factors.—Birds, toads, spading up the earth, hot water, and destroying fallen fruit.

FLIES.

APPLE MAGGOT (*Trypeta pomonella*). A footless, white grub, one-fifth inch long, eating in the fruit; changes in the ground. Adult fly in July; body, black; head and legs, red; wings, white, black banded.

Beneficial factors.—Destroy all fallen fruit.

APPLE MIDGE (*Sciara mali*). Grub, slender and glassy white, boring in the flesh of the apple, and changing there. Adult, black above, with yellow bands; yellow below; legs black. Does little damage.

Beneficial factors.—Birds. Destroy fallen fruit.

